Teaching Statement

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As a first-year undergraduate in chemistry, I had once thought of changing my major when I found it difficult to make connections between the concepts and to catch up with my peers. These issues were tackled owing to the assistance from a professor in an inorganic chemistry class, and now I am enjoying my current dissertation research in computational chemistry. It makes me realize that effective teaching is able to stimulate students and prepare them to be future chemists, which I believe is equally important as conducting scientific research in terms of the development of the whole chemistry community. This experience also shapes the embryo of my teaching philosophy: **to help student foster an interest, establish a logical network of concepts, and become a better learner.** I, as a future instructor, am sharpening my skills to effectively carry out this philosophy.

The lecturer's own enthusiasm greatly affects the motivations of students, as I experienced both as a student and as a teacher. For example, the professor mentioned above was very excited to show a few slides at the end of a class introducing the synthetic design, experimental approaches, and devices made from carbon nanotubes, with which her research group were working with. We were interested to see the real-world applications beyond the words in textbook. I also found it useful in my own teaching experience, when I was leading a discussion section entitled for a course called "modern applications of chemical principles". The students were asked to locate a relevant article on the basis of a given paper about sustainable energy, present and discuss them in groups. Before that week, I shared with them an extra little review on the fundamental principles of light harvesting and current development in energy science, as I was working in this field in my undergraduate research. I could see that the students paid full attention to my talk and asked lots of scientific questions in details, although these contents were not covered and required in that course. I was glad to see that discussions could be facilitated in this way. *(to be provided: papers from students after the discussion with permission)*

Another goal I tried to follow is to help students construct knowledge by reproducing the concepts and contents in a logical and acceptable way by collecting prompt feedback. As a student, I used to summarize the main contents covered in the whole semester into multilevel lists and conceptual graphs according to my own understanding. *(to be provided: sample notes)* I myself found such "concentrated textbook" extremely useful, and I was thinking of presenting the structures of knowledge in this way when I gave a lecture. After I put it into the practice, however, I found a gap between the representation of knowledge that is thought to be clear by the teachers, and the representation that students are comfortable with. For example, I am mentoring an undergraduate in our lab for her independent research course. I tried to cover some basic knowledge involved in her project at the beginning. As I explained, I noticed that some concepts were too abstract for her that I failed to describe them thoroughly, while I explained too much for some simple points.

Then I stepped back and got feedback from her frequently as I went along, and adjusted my pace accordingly, which actually made the short lecture more efficient than before. Developing prompt assessment is therefore a crucial goal for my future teaching. This process, in the other hand, could facilitate self-development of instructors as well in terms of revisiting and gaining deep understanding of the subjects.

My expectations for students are not restricted to my own course, but would extend to their future development – higher level courses, independent research and careers all require an ability of learning due to the rapidly evolving nature of science. The way I summarize the contents covered in a course as mentioned above was developed during a course called "interface chemistry", where the instructor asked us to turn in conceptual graphs once a month that should cover all of the main concepts introduced in that month. I found it a good way of helping students learn how to learn, and therefore, I would focus on designing assignments, assessments and tests like this which would effectively turn students into good learners in my future course design.

Beyond the teaching philosophy, I learned another important lesson as how the students would be more engaged and benefit more from a class when some activities are designed in a logical way and students are fully aware of that logic flow. When I was brand new to teaching as a lab TA for the "core concepts in chemistry" course, I asked a group to redo another trial for collecting kinetics data after they failed the last one, and they asked me why at all they needed to perform a parallel experiment for three times. Not until then did I realize the importance of explaining to students why certain experiments are designed instead of just providing them a "manual". Accordingly, I stopped directly inheriting the slides provided by the lab manager, and came up with new ones that follows the logic flow: "real-world problems -> chemical methods to solve them -> fundamental principles of these methods -> techniques involved to perform the methods -> how they reflect in today's experiments -> experimental details" *(to be provided: ppt slides examples).* Once after, one of the students said that he could compare the effectiveness of the antacids he uses most for heartburn by following the titration procedure they did today. *(to be provided: feedback from students collected at the end of the semester)*. It inspired me that in the future, I would design a lab course from a problem-solving point of view and relate it more closely to the lectures, and evolve it by collecting feedbacks from students.

My teaching philosophy was, is, and will be, continuously growing as I gain more teaching experience. For example, in the biophysical chemistry course I am TAing now, I begin to try presenting to the students some concrete examples from research papers, and walking them through the process of finding suitable models that we learn and designing experiments accordingly. In this way, I hope to prepare students to be independent researchers. As a future instructor in a science classroom, I believe I am able to develop an effective "Ellie" style of teaching specifically for science students, and will continue enjoying the process of teaching and developing.